Aspects of Reproduction in the Whiptail Wallaby, *Macropus parryi*

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The whiptail wallaby, *Macropus parryi* Bennett, 1835, is a large slender macropodid which is common in Queensland and locally common in northern New South Wales. Relatively little is known about its biology. Calaby (1966) briefly reported on the habitat, habits and numbers of this species in the Upper Richmond and Clarence Rivers area of northern New South Wales. Clark and Poole (1967) mentioned in passing that the whiptail wallaby resembled the grey kangaroo, *Macropus giganteus,* in not having a post-partum oestrus. Calaby and Poole (1971) quoted unpublished data of Merchant for the length of oestrous cycles, gestation periods and pouch life. However, no data are available to indicate whether embryonic diapause occurs in the species.

This paper reports data on reproduction obtained from a small sample of whiptail wallabies collected in September, 1971 at Coombadjha (29° 21' S, 152° 31' 42" E) on the Clarence River about a mile from its junction with the Mann River. The habitat was partly cleared, dry sclerophyll forest essentially the same as described and figured by Calaby (1966). The sample of *M. parryi* was collected to investigate the mode of inheritance of the enzyme phosphoglycerate kinase (P.G.K.) and to further studies on X chromosome inactivation in macropodids. These results are reported elsewhere (VandeBerg, Cooper and Sharman, 1973). In addition some data were collected on reproduction and are reported here.

Half of each ovary and a piece of uterus were collected from all females carrying pouch young. These were fixed in Bodian's solution, embedded in paraffin, sectioned at 7 or 8 μ m and stained in haematoxylin and eosin. A blastocyst was recovered from female 27 (Table 1) using Sharman's (1955) method. Standard body measurements were recorded for all animals and weights and pouch depth or scrotal size were recorded for all adults and juveniles. A total of 41 adults and juveniles was collected.

18 breeding females ranged in weight from 8.5 kg (molar eruption stage MII.O, (Maynes, 1972) primiparous) to 12.8 kg (multiparous); while 12 mature males ranged from 13.4 kg (almost MII.2) to 25 kg.

Table 1 gives the body measurements of the pouch young of 16 females taken during the period 23-27 September, 1971. Limited data on growth of pouch young in captivity and comparison with the growth of pouch young of other

species (*M. parma* (Maynes, 1972); *M. eugenii* (Murphy and Smith, 1970) and *Megaleia rufa* (Sharman, Frith and Calaby, 1964)), suggests a range in age from about 1 week to about 35 weeks. Thus the whiptail wallaby would appear to breed at least from January to September. The data do not exclude the possibility that they breed year round.

TABLE 1

Body measurements of pouch young of whiptail wallaby (all measurements in mm)

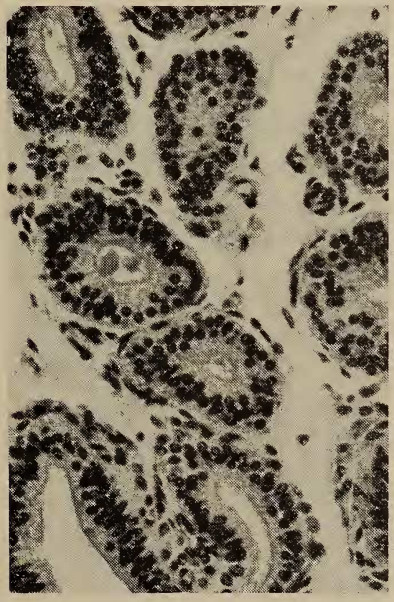
Parent No.	*Sex of P.Y.*	*Head*	*Ear*	*Arm*	*Leg*	*Foot*	*Body*	*Tail*
30	♂	9.4	2.2	5.1	3.0	4.1	25.8	7.2
34	♀	19.5	5.3	11.1	14.0	10.1	56.1	25.2
54	♂	20.0	6.6	12.3	15.1	11.8	65.6	23.2
32	♀	21.2	6.8	12.9	18.0	12.8	67.6	32.6
16	♂	28.9	9.9	18.2	28.1	20.9	93.9	45.4
9	♂	34.8	11.4	22.3	37.0	28.2	109	68.2
46	♀	36.1	11.9	22.2	39.0	28.5	106.1	62.5
5	♀	36.1	13.4	23.5	43.2	32.4	117	76.0
42	♂	38.5	13.3	23.8	40.2	31.2	112.4	69.2
57	♂	48.1	17.8	31.0	55.7	42.9	137	90
48	♀	48.0	18.9	31.7	64.5	50.5	145	100.8
7	♂	49.5	17.8	30.7	59.2	45.2	145	93
14	♀	52.1	21.5	34.4	71.1	56.5	162	104
23	♀	70.6	38.7	57.0	132	107	236	216
19	♂	73.3	37.5	58.5	130	111	245	211
27	♀	91.6	73.6	83.9	196	168	348	395

Examination of the ovaries and uteri of those females carrying a pouch young showed that all except female 27 were anoestrous. The uterine glands of anoestrous females were small and scattered with little or no lumen present. They consisted of low columnar epithelial cells with oval nuclei occupying about half to two-thirds of the cell. The uterine lumen was lined with cuboidal epithelial cells having mainly oval nuclei which occupied most of the cell. A few females had large atretic follicles up to 1 mm diameter. Female 19 had a large non-atretic follicle of 1.5 mm diameter.

Female 27 had a blastocyst, with an external diameter of 257 μ m (measured after fixation), present in the right uterus. Tall pseudostratified columnar epithelial cells with mainly oval, basally-situated nuclei lined the uterine lumen. The uterine glands had tall columnar cells with rounded nuclei. The lumina of most glands were open and had some material present in them (Fig. 1). There was no evidence of either coagulated semen or sperm in the uterine glands or the uterine lumen. Neither was there any sign of mitoses in the uterine glands or lining. The right ovary had a large corpus luteum with large luteal cells possessing rounded nuclei (Fig. 2). No mitoses were observed in the luteal cells. It is concluded that this female was either in a quiescent state (Clark and Poole, 1967) or just coming out of it.

These data support the statement by Clark and Poole (1967) that *M. parryi* does not have a post-partum oestrus. The presence of a large functional follicle in female 19 and the blastocyst in female 27, suggest that mating may occur while females are carrying a large pouch young. Following mating, the embryo derived from it would become quiescent and would not begin to develop until towards the end of pouch life of the primary young. During the early period of pouch life there is direct inhibition of ovarian activity by the suckling young as shown by females 30-23 (Table 1). Such a reproductive pattern has been observed in the eastern grey kangaroo, *M. giganteus,* by both Kirkpatrick (1965) and Clark and Poole (1967).

Direct inhibition of ovarian activity by a suckling young appears to be the ancestral form of ovarian inhibition (Sharman and Berger, 1969). It has been retained to varying degrees by the parma wallaby (*M. parma*), the whiptail wallaby (*M. parryi*) and the grey kangaroos (*M. giganteus* and *M. fuliginosus*). In all other macropodids that have been studied in detail, this primitive form of ovarian inhibition has been lost completely. In these species, ovarian inhibition while carrying a pouch young is maintained by the suckling stimulus acting via the corpus luteum of lactation derived from a pre- or post-partum oestrus (Sharman, 1970). The reproductive patterns shown by *M. parma, M. parryi, M. giganteus* and *M. fuliginosus* are thus regarded as being representative of different stages



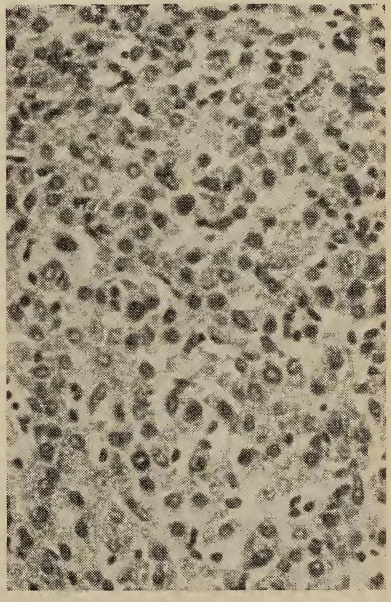


Fig. 1. (left): Uterine glands associated with 257 μm blastocyst of the whiptail wallaby. Uterine lumen lower left.

Fig. 2. (right): Corpus luteum associated with 257 μm blastocyst in the whiptail wallaby.

in the evolution of embryonic diapause and ovarian inhibition as observed in other macropodids.

The retention of transitional reproductive patterns in some species of the genus *Macropus* cannot be regarded alone as evidence for, or an indication of, a close affinity between these species.

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